

DISTRIBUTION OF MINUTES FOR THE ALPHAMAGNETIC SPECTROMETER-2 TECHINCAL INTERCHANGE
MEETING ON JANUARY 17, 2003.

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See Attachment 1 for a list of meeting attendees/
additional minutes recipients.

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**NASA JSC
Payload Safety Review Panel
Alphamagnetic Spectrometer-2
Technical Interchange Meeting**

**Minutes of Meeting
January 17, 2003**

1.0 INTRODUCTION

1.1 General: The Payload Safety Review Panel (PSRP), chaired by JSC/MA2/A. M. Larsen, met via teleconference on January 17, 2003, with representatives of the Lockheed Martin and Boeing, the Payload Organizations (POs), at the Regents Park III Conference Facility for an Alphamagnetic Spectrometer-2 (AMS-2) Technical Interchange Meeting (TIM). JSC/NC44/A. N. Nelson, Jr. and S. J. Daniel, the supporting Payload Safety Engineers (PSEs), introduced the meeting and attendees (see Attachment 1).

1.2 Background: The AMS-02 includes a large superconducting magnet that is being built by Space Cryomagnetics Limited (SCL) of Culham, England. The cryogenic system on AMS-02 employs three burst disks in a single series for the Superfluid Helium Tank Pressure Relief System and another three burst disks in a single series for the Vacuum Case Pressure Relief System. Additional burst disks are used as appropriate to protect other small volumes from excessive pressures. AMS-02 will certify all burst disks to meet NSTS-JSC, TA-88-074 (October 18, 1988), 'Fault Tolerance of Systems Using Specially Certified Burst Disks.'

1.3 Scope: This meeting focused on the PO assessment that helium venting poses no credible hazard to overpressurizing the Shuttle payload bay. The PSRP discussed no previous Action Items (AIs) associated with this payload.

1.4 Conclusion: Two agreements and no action items resulted from this meeting. No Hazard Reports were discussed at this meeting. The PO's testing and analysis suggests that there is no need for special provisions associated with this potential situation.

2.0 SIGNIFICANT SAFETY DISCUSSION

2.1 Burst Disks: The PO recommends a design known as Reverse-Acting Circumferentially-Scored with Cutting Teeth Burst Disk Design. This design is truly redundant because the burst disk is designed to open along the scored line. If the burst disk fails to open along the scoring, then the teeth act to initiate a tear along the scored line. Since the actual flight burst disks cannot be tested in this design, AMS-02 recommends a rigorous lot-testing plan. British Standard 2915, that is typically used by British burst disk manufacturers, recommends testing of 2 disks out of a lot of 10. AMS-02 will test 4 out of 6 disks.

In addition to the proposed testing, the burst disk manufacturers maintain databases of information on this type of burst disk design. By applying statistical analysis the PO will demonstrate certainty to an acceptable level that the flight disks will operate within a given range of burst pressures. The Maximum Design Pressure (MDP) associated with that burst disk will use the upper limit of this range. This is the same technique that burst disk manufacturers have used in the past for aerospace applications.

The burst disk manufacturer will supply Certificates of Compliance to confirm burst disk lot numbers and material certification and compliance for each disk.

2.2 Venting Analysis: To provide two fault tolerance against burst disk atmospheric leakage into the AMS vacuum case or premature actuation, the system has three burst disks in series. For safety, AMS is designed for minimum risk and the burst disks will comply with NASA Letter #NSTS-JSC, TA-88-074. The PO believes that a failure after the payload bay doors are closed that results in overpressurizing the payload bay doors is not credible. The PO indicated that the O-ring gap is the 3 inches long by 1.043 thousandths inch thick. Release of the burst disks would over-pressurize the payload bay, but such a leak is monitored on ground prior to launch and the build-up would take two hours to get to a point that it would cause a problem in the payload bay. By then the Shuttle is on-orbit with the payload bay doors open and there is no problem. The PO clarified that, in the event of an abort landing, the payload bay vent doors stay open, and, again, there is no problem. The PO would need to request a deviation on the standard vent door closure time-closure is a crew operation-as a Payload Integration Plan/Mandatory Inspection Point modification to assure that this is in the procedures. The PO agreed to provide a thorough explanation of the continuous venting activity and characterization of the situation for the Phase II Review (Agreement 3.1). The PSRP concurred with the PO assessment that there is no need for a full-scale vent test because the manufacturer's analysis is enough. The PSRP also agreed that there is no need for a Shuttle Payload Bay overboard vent. The PO clarified that during ascent there is no venting; the nominal, planned venting of 3.7 liters/minute occurs after 3 minutes into launch. The PO understands that this venting in the payload bay will require an Interface Control Document change. The PO agreed to submit details of the lot screening program materials and process data for JSC Engineering review (Agreement 3.2).

2.3 Hazard Report Discussion: The PSRP discussed no HRs associated with this payload at this meeting.

3.0 AGREEMENTS

3.1 The PO agreed to provide a thorough explanation of the continuous venting activity and characterization of the situation for the Phase II Review.

3.2 The PO agreed to submit details of the lot screening program materials and process data for JSC Engineering review.

Original Signed by:

JSC/NC44/A. N. Nelson, Jr.
Payload Safety Engineer

Original Signed by:

JSC/NC44/W. Stauffer
Technical Writer

Original Signed by:

JSC/NC44/S. J. Daniel
Payload Safety Engineer

Status of Hazard Reports Presented

The PSRP discussed no HRs associated with this payload at this meeting.

Previous Action Item Status

The PSRP discussed no previous AIs associated with this payload.

ATTACHMENT 1

Payload Safety Review Attendance Log

Payload: AMS-2 TIM

Meeting Date: January 17, 2003

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